

***United States Court of Appeals
for the Second Circuit***



**APPELLANT'S
BRIEF**

74-1765

**United States Court of Appeals
FOR THE SECOND CIRCUIT**

Appeal Docket No. 74-1765

ESSO RESEARCH AND ENGINEERING COMPANY,
Plaintiff-Appellant,

v.

KAHN AND COMPANY, INC. and CHANDLER-EVANS, INC.,
Defendants-Appellees.

**APPEAL FROM A JUDGMENT OF THE UNITED STATES
DISTRICT COURT FOR THE DISTRICT OF CONNECTICUT**

BRIEF FOR PLAINTIFF-APPELLANT

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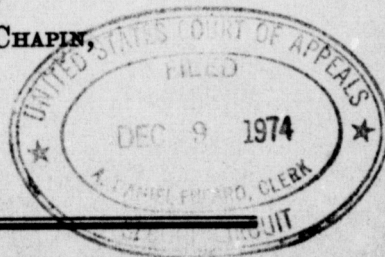


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Statutes

Patent Act, Section 103
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Conditions for patentability; nonobvious subject matter.

A patent may not be obtained though the invention is not identically disclosed or described as set forth in Section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Abbreviations Used:

- App. — Joint Appendix
- PX — Plaintiff's Exhibit
- DX — Defendants' Exhibit
- Pages preceded by E refer to the Exhibit Book.

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BRIEF FOR PLAINTIFF-APPELLANT

Preliminary Statement

This is an appeal from a judgment entered April 30, 1974 in the United States District Court for the District of Connecticut by the Honorable M. Joseph Blumenfeld holding U.S. Letters Patent 2,944,627 to be invalid as not meeting the nonobvious test for patentability set forth in 35 U.S.C. §103.

The Issues Presented for Review

POINT I

Where an invention lies in a combination process of eight elements, did the Trial Court err in not applying a standard of patentability which would acknowledge invention to be possible even if the individual elements could separately be found among some ten references?
Plaintiff-Appellant would answer "Yes".

POINT II

Does retrospective analysis of the prior art meet the "obvious to one skilled in the art" test of invalidity of Section 103 of the Patent Act of 1952 when those skilled in the art did not in fact believe that the subject process could operate successfully?

Plaintiff-Appellant would answer "No".

POINT III

Did the Trial Court err in ignoring the unexpected results obtained from the invention of the patent in suit in its determination of validity?

Plaintiff-Appellant would answer "Yes".

POINT IV

Did the Trial Court err in misapplying what established physical laws concerning gas-pressure relationships would actually teach those skilled in the art concerning an adsorption process, a different phenomena?

Plaintiff-Appellant would answer "Yes".

POINT V

Did the Trial Court err in interpreting a claim in a corresponding German patent application to be an "admission" where:

- (A) No testimony was presented on German Patent Law, nor the specific claim cited,
- (B) The Trial Court's interpretation is in conflict with the concept of invention lying in a combination of required process features,

- (C) The Trial Court's application of German Patent Law in interpreting the German claim is in conflict with German authorities and decisions.

Plaintiff-Appellant would answer "Yes" as to each of (A), (B) and (C).

POINT VI

Did the Trial Court err in applying an "inventive genius" test when the 1952 Patent Act expressly negated such a requirement?

Plaintiff-Appellant would answer "Yes".

Statement of the Case

This is an appeal from the decision of the United States District Court for the District of Connecticut dismissing a suit for patent infringement on the ground of invalidity of the Skarstrom patent, U.S. Letters Patent No. 2,944,627 (PX 1, p. E-1; hereinafter referred to as "Skarstrom Patent" or "patent in suit") as failing to "meet the nonobvious test for patentability set forth in 35 USC § 103" (App. 61a). The suit was brought by the Esso Research and Engineering Company (hereinafter referred to as "plaintiff") against Kahn and Company, Inc. (hereinafter referred to as "defendant"), a manufacturer of drier units sold to operate in the manner called for by the process claims of said Skarstrom patent. Defendant's president, Irving Kahn is referred to as "Kahn". Chandler-Evans, Inc., a customer of Kahn and Company, was also joined as codefendant since it actually operates the drier pursuant to Kahn and Company directions. Both Kahn and Company and Chandler-Evans, Inc. admitted infringement of claims 9, 12, 14, 16, 17, 24 and 34 of the Skarstrom patent (App. 19a).

Subsequent to the trial in the District Court, defendant moved "For Leave to Request the Plaintiff to Admit the Genuineness and Accuracy of Translation of New Documentary Evidence and To Re-open for Additional Testimony Based on Such New Evidence" (Index to Record on Appeal, Volume VIII, document 54, filed in the U. S. Court of Appeals for the Second Circuit July 9, 1974. The alleged evidence was a decision received after the trial in the opposition filed in Germany to the corresponding German Skarstrom patent. This German decision was thereafter appealed. Ultimately, both motions were withdrawn. The sole addition to the record was an agreed upon translation of the German claim in opposition (App. 37a-38a).

Background of the Invention

(1) Prior Art Systems

The patent in suit (Skarstrom invention) relates to the separation of gases by means of adsorbents, and particularly the drying of air by removal of water vapor as the air passes through an adsorbent bed.

The example of removing water vapor from the air will hereafter be used for illustration since in fact the infringing devices are driers designed to remove water vapor from air or similar gases.

Among general methods which have been advanced for separating water vapor from air are cooling the gases so that water condenses as a liquid; or passing the gases into contact with a solid (referred to as an adsorbent) which has the ability to adsorb or pick up certain components, such as water vapor, on its surface and thereby separate it from other components. In many uses, after the solid is saturated it may be discarded. Alternatively, in order to have a continuous system, the adsorbed component can be removed

from the adsorbent by suitable regeneration of the adsorbent solid.

The need to dry air or similar gases is a very common problem found in the industry. The user wishes to purchase an automatic "plug into the wall" system which will serve to effectively dry the gases, which typically are under pressure. Such unit should be self-contained, or in other words be sufficient within its structure and operation to accomplish this end. Practically, drying or fractionation should not require the addition of large plants or the like* since this would be uneconomic and tantamount to using a "cannon to kill a fly."

The most typical prior art system for satisfying this need was the so-called heated bed adsorptive drier.** This heated bed drier (the breakdown of which prompted the Skarstrom invention) operated in the following manner: air was fed at elevated pressure to one of the two paired vessels containing adsorbent beds. As the air passed through the first bed, it was dried, thereby wetting the bed. The feeding of the air was continued for a matter of hours, e.g. 6 hours or more (App. 206a, 167a-170a). After this long adsorption period, the adsorbent becomes nearly all wet or saturated with water and must be regenerated or dried out. Heat was supplied to the wet adsorbent solids so as to "cook out" the water which has been adsorbed (App. 168a, 206a). This step is the separation of the water molecules from the adsorbent solid. The heating could be effected by having heaters within the adsorbent bed or alternatively heating a source of hot gas supplied to the bed (App. 94a-95a). The solids after the regeneration step at high temperatures had to be cooled for an extended time

* Such as air liquefaction plants where air is subjected to extremely low temperatures to liquefy oxygen and nitrogen.

** Typical examples of which are shown in the bulletins of patentee's initial licensee, Trinity Equipment Corporation, PX 6A and 6B, pp. E81-E90.

before they were ready for the next adsorption step.* To aid in the removal of the water cooked out by heating, a small amount of gas might be used as a sweep or carrier gas (PX 6A and 6B, pp. E81-E90). A convenient source of such sweep gas was a small percentage, i.e. two or three percent, of the product withdrawn from the adsorption zone (App. 207a, 226a). This was the unit Skarstrom had in his laboratory at the time of his invention. The heated adsorptive drier was the standard in the field for a number of years (App. 223a-224a). Indeed, Feeley, president of a company which manufactured such heated driers, was not aware of any automatic driers which did not use heaters (App. 224a).

(2) Basic Laws of Physics Remain Unchanged

For several hundred years prior to the present invention, several well-known laws of physics have been taught for describing gas behavior under pressure. By definition, such general laws help to explain, albeit in retrospect, the theoretical concepts underlying any new developments involving gas and pressure, assuming perfect gas behavior. Sometimes they are helpful to predict results, and sometimes they are used as a "Monday morning quarterback" to explain what did happen. If they couldn't, they would no longer be considered "laws." Typical of such laws are Boyle's law and Dalton's law.

Boyle's law states that, assuming the temperature is the same, the volume of a gas is inversely proportional to its absolute pressure (App. 240a).

Dalton's law provides that the total pressure of a gas mixture is the sum of the partial pressures of the individual gas components in the mixture (App. 49a).

* Solid adsorbents do not absorb water as well at high temperatures as at room temperature.

Both relate to the relationship of gases and pressure. *Neither* of these "laws" relates to adsorption of gases on solids.*

Another fundamental concept of physics is that to have a continuous cyclic adsorption process, all the water picked up during one adsorption cycle must be removed during the subsequent desorption cycle, i.e. a "balanced operation." Water into the system must equal water out of the system.

Summarizing, laws such as "balanced operation" and Boyle's and Dalton's laws were well known and go back several hundred years. The cyclic heat-regenerated drier (referred to in the Trial Court's opinion as "Trinity drier") served the need for a compact, self-contained unit capable of drying air. Such unit adsorbed for several hours, followed by cooking off the adsorbed water by heating for several hours. A cooling step was needed prior to re-instituting adsorption. To aid in the removal of the water cooked off the adsorbent during heating, a small, e.g. two to three percent, fraction of the dry air product of the adsorption step was used as a sweep gas.

Skarstrom's Unplanned Invention

The inventor, Dr. Skarstrom, who has a PhD degree in physics (App. 200a) was working at the research laboratories of plaintiff—"all my professional life, sir, I have been studying and devising ways to separate gases and measure the separations accomplished thereby." (App. 201a) Dr. Skarstrom had spent some 27 years in the research laboratories and had 35 patents (App. 201a).

* Encyclopedia Britannica used by defendants' expert Prutzman in his preparation as an expert witness (App. 235a, 247a) illustrates that Boyle's law and Dalton's law relate to the "Kinetic Theory of Gases" which is distinct from, and non-cross indexed to, the section on "Adsorption." See also App. 176a-177a, where Meissner indicates they are separate areas. The Britannica indicates that Dalton's and Boyle's laws go back to the 17th Century.

In September 1956, he was working on a water analyzer and employing a heated-type drier manufactured by Trinity Equipment Corporation (App. 202a-205a) to secure dry air (the "Trinity drier"). The Trinity drier was set for "six hours on-stream adsorbing, three hours cooked, three hours rest" (cool down) for a total of a 12-hour cycle (App. 206a). He had worked with such heated driers for about five years previously (App. 203a-204a). During the experiments, one of the heaters positioned within the adsorbent vessel of the heated drier burned out. He called the manufacturer and asked for a new heater, but was told they didn't have any in stock (App. 204a-205a). Dr. Skarström now had an inoperative drier on his hands.

One morning while driving to work, Dr. Skarstrom decided that "I ought to try, on the basis of a hunch, to see whether I would get it to operate without a heater." (App. 206a) Dr. Skarstrom didn't know what gave him the hunch.

By accident, Dr. Skarstrom had a gear in stock which was capable of changing the timer setting on the burned-out Trinity heated drier. It changed the cycle to 30 minutes on adsorption and 30 minutes for regeneration (as compared to the original six hours and three hours the unit was designed for) (App. 206a). He was "surprised because it did some drying." (App. 207a) Having another gear in stock that fit the timer, he changed the cycle to 20 minutes on adsorption, 20 minutes regenerating, and to his "pleasant surprise" the product got dryer (App. 207a). He hadn't expected this result (App. 207a). He then decided to increase the purge from the three percent level the Trinity unit had been designed for. He had to change the valve to a much bigger valve so that he could increase the purge from three percent to fifty percent (App. 207a-208a) (and later twenty-five percent, App. 44a). He found that the larger purge gave even better dryness to the product. He made a further change to the purge valve to insure

that, regardless of which bed was being desorbed, the same quantity and flow rate of purge gas resulted at the higher volume of purge (App. 209a). Continuing his empirical approach, Dr. Skarstrom went to shorter cycles. He installed a faster cycle timer and ultimately went to the maximum speed of this new timer which happened to be three minutes on adsorption and three minutes on desorption (App. 210a). The product obtained by using these conditions was so dry that in further tests, it could not even be measured by the system Dr. Skarstrom had been using and the reading went off the recorder chart (App. 211a-212a). This indicated to Dr. Skarstrom that he had been able to obtain dryness approaching one-tenth of one part per million* of water. As explained by plaintiff's expert, Professor Meissner (App. 84a) one percent by volume water vapor in the air (typical ambient conditions) equals ten thousand parts per million of water. Thus, Skarstrom was reaching dryness levels of less than one one-hundredth of a percent water vapor in the dry product (one-tenth of one part per million)—or air one hundred thousand times drier than typical room air.

That Skarstrom's Process Would Work Startled Others

In spite of Dr. Skarstrom's some 27 years experience in the field, he was surprised at the results he obtained, *i.e.* obtaining the driest air he had ever seen (App. 210a-212a).

When showing his process to the Trinity salesman, and commenting that "I didn't need the stupid heater," the salesman "was appalled" (App. 213a).

Trinity, who manufactured heated driers, immediately became interested when hearing of the Skarstrom process. As Feeley, its president, testified (App. 228a), "it was

* Parts per million are used as a convenient expression of small volume percents. It is abbreviated as "ppm."

almost contrary to everything that all the literature had said up to that time as to what you had to do to get moisture out of a desiccant."

In spite of the fact that Skarstrom's "heaterless driers," as they were so nicknamed, were less expensive than heated driers, Trinity's plaintiff's first licensee, initially had considerable difficulty in selling them. Engineers, who comprised Trinity's potential customers, simply did not believe they would work (App. 229a). It was contrary to their background and information. Trinity was forced to build "see-through" glass models where the absorbent changed color in the presence of moisture, in order to overcome the disbelief of engineers in the field that Skarstrom's process would actually work (App. 229a-230a).

Plaintiff's expert witness, Professor Meissner, who has a PhD in physical chemistry (App. 77a) and has been a full professor at MIT in chemical engineering for over 20 years (App. 78a), in spite of being quite familiar with the adsorption of mixtures (App. 78a-79a) (as well as Boyle's and Dalton's laws), testified that he, too, had doubts that the Skarstrom process would in fact work (App. 127a).

When defendant's own engineers, Sheldon (Vice President—Engineering) and Kennedy (engineer solely concerned with drier development),* "excitedly" told Kahn that they had discovered the heaterless drier operation, they were very much elated and proceeded to file a patent application on it (App. 290a). Although Kahn's testimony attempted to show otherwise, both defendant's original patent application as filed and its literature describing same (App. 290a-291a; DX TTT, p. E-127) illustrated the basic Skarstrom heaterless drier operation in suit.**

* App. 276a, 284a.

** Defendant does not claim prior inventorship to Skarstrom of anything that is shown in the patent (App. 285a). Defendant's reaction in filing a patent application in suit, however, is illuminating.

In contrast, Prutzman was defendants' sole expert witness. Prutzman is a patent attorney who has had no direct experience with adsorption technology either as attorney or engineer (App. 248a). Nevertheless, after reading about adsorption for an hour or so, he thought "that's a fairly simple subject" (App. 248a). He testified that the Skarstrom process would be obvious so long as one knew Boyle's law and Dalton's law, which could be found in any high school physics book (App. 240a).

Yet somehow, Dr. Skarstrom, Kahn's top engineers, the engineers out in the field who comprised customers for driers, and Professor Meissner, all of whom were familiar with these basic physical laws, quite apparently did not find the invention in suit so obvious.

Skarstrom Obtained Unexpected and Exciting Results

The results obtained by Skarstrom's process are unexpected, and offer material advantages over the prior art. Quoting from defendant's own letter (App. 292a; PX9, pp. E-104 and E-105) to his field representatives at the time of introducing the heaterless drier:

"The advantages are startling—no heaters, no explosion hazard, extremely simple mechanism, reduced cost.

Similarly, the brochures of Trinity, plaintiff's initial licensee, indicate that the heaterless driers provide super-dry air or gas, completely eliminate costly electric or steam heaters, reduce corrosion due to the elimination of elevated temperatures, provide lower initial installation, operating and maintenance costs. This is done while having an automatic, self-contained system of relatively small size which need only be plugged into the wall (PX 6C and 6D, pp.

E-91-102; heaterless drier operated in courtroom, PX15; Feeley testimony App. 231a). Units have had remarkable records of operating for years. For example, one of Dr. Skarstrom's laboratory units operated for 13 years and another for over 11 years with only minor mechanical problems (App. 214a-215a).

Perhaps most remarkable and unexpected was the fact that the heaterless drier was capable of producing dry gas of less than one part per million water. This was the driest gas Dr. Skarstrom, a PhD physicist of many years experience, had ever seen, and indeed could measure (App. 211a-212a).

The unique ability of the heaterless drier as an automatic self-contained drier capable of producing super-dry gas was illustrated by its use in launching the initial Vanguard missile. When problems arose due to freezing of moisture in the pneumatic lines to the missile, one of the earliest heaterless driers was successful in super-drying the air and contributing to America's initial successful missile launch (App. 232a).

Thus, Dr. Skarstrom had converted a broken down standard heated adsorptive drier (Trinity drier) to operate in a new manner which not only worked without supplying any external heat or purge gas, but gave the best drying he had ever seen—results much better than the units which had been used as the industrial standard of automatic self-contained driers for many years previously.

Existing manufacturers of heated driers such as Trinity, Pritchard, Dielectric Products (members of the industry organization which defendant also belonged to) soon approached plaintiff and became licensees (App. 288a). Indeed, plaintiff has licensed over twenty companies worldwide to manufacture and sell gas fractionation units, particularly driers, operating under the Skarstrom patents

which have issued in some sixteen countries.* It was at the behest, and for the protection of heaterless drier licensees, who competed with defendant in the marketplace that the present litigation was instituted.

Basic Description of Skarstrom Invention

The invention of the patent in suit is admittedly complex. Indeed, when the trial was concluded and explanations of both expert witnesses completed, Judge Blumenfeld noted "I suppose nobody knows what goes on inside" (App. 294a), referring to the heaterless drier actually operated in the court room.

The claims of the Skarstrom patent which are the subject of this suit are claims 9, 12, 14, 16, 17, 24 and 34 and will be found, of course, in the Skarstrom patent (PX1, p. E-1). Since complex claims as drafted by patent attorneys are notoriously difficult to deal with, a summary statement of the Skarstrom invention was prepared for trial (PX 16, p. E-113). The statement was initially prepared by Professor Gilliland, Chairman of the Department of Chemical Engineering at M.I.T., who, due to illness, was not able to act as plaintiff's expert witness, and passed away shortly before trial. Plaintiff's expert witness, Professor Meissner, also a Professor of Chemical Engineering at M.I.T., carefully reviewed the general description with Dr. Gilliland and both considered it the most concise, accurate and understandable description of the Skarstrom invention (App. 172a-174a). Prutzman, defendants' expert witness, agreed that it is an accurate statement of the Skarstrom process (App. 250a).

Quoting from the Exhibit 16 summary, the Skarstrom invention is:

"A completely self-contained, self-regenerating gaseous fractionating process utilizing a selective

* Plaintiff's Answer to Defendant's First Set of Interrogatories, pages 9, 15-17, pp. E-107-E-110. Only the German patent application remains pending in an opposition proceeding.

adsorbent in which the adsorbent bed is the sole agent for fractionation and heat exchange which comprises:

- (1) a repetitive adsorption/desorption process utilizing differences in pressure;
- (2) wherein gaseous feed is introduced at one end of the adsorbent bed and product effluent recovered at the other end;
- (3) a part of the product effluent is used to desorb the bed (or essentially the same product effluent from a paired companion bed on a complementary cycle);
- (4) by counter-current flow at lower pressure than the adsorption pressure;
- (5) with cycle times sufficiently short so that heats of adsorption/desorption are substantially retained and balanced within the adsorbent bed;
- (6) the adsorption/desorption being effected so as to create an oscillating concentration front which remains in the adsorbent bed with only a fraction of the adsorbent bed being utilized for most of the adsorption/desorption;
- (7) said process operating so as to eliminate the need for any supplemental heat exchanges; and
- (8) the need for any external purge gas supply."

First, as seen from the above summary as well as stated in Judge Blumenfeld's opinion (App. 40a-41a), the invention relates to a process for the separation of gas from a mixture of gases through selective adsorbent by "performing a *combination* of specific designated steps in a particular sequence and manner under defined conditions." (emphasis added) Thus, it should be clearly understood that Skarstrom does not claim invention to reside in a single process feature, but rather in a *combination* of specific designated steps operating in the manner defined in order to give Skarstrom's results.

In a preferred embodiment, Skarstrom also teaches that in his process the volume of dried air used to purge the bed during the desorption cycle is the same volume as the volume of wet feed gas introduced, i.e. a 1:1 ratio (claims 12 and 14). Note this is their ultimate meaning as finally admitted by defendants' expert (App. 256a-257a), and explained to Judge Blumenfeld (App. 259a-262a). This allows the Skarstrom process to achieve maximum product recovery and yet still successfully desorb (App. 262a-263a). Minimization of purge gas is highly important to Skarstrom, who must rely only on his desired product for purging (which is thus "wasted") and has no external source of purge gas or heating.

Each of the features called for in the above summary (PX 16) is required; no one feature in and of itself defines the patentable concept. The invention can be considered to reside in a combination of features, no one of which is necessarily new.

Attention should be particularly focused on the fact that the invention is "a completely self-contained, self-regenerated gaseous fraction process . . ." This means a process which, having a feed gas under pressure, is fully operative within itself and requires no extraneous source of purge gas, no outside equipment, no external source of heating or cooling. This is a unit which can be simply plugged into a wall. Self-regenerating means that the process provides its own regeneration through the use of product (dry air) derived directly from the adsorber. It does not require an *extraneous* source of purge gas, such as might be available from a liquid air plant (a plant where air is chilled to extremely low temperatures and made into a liquid with its components primarily oxygen and nitrogen thus separated, and available, App. 118a).

During adsorption of water from the feed air, heat is given off. In the Skarstrom process, this heat is main-

tained within the adsorbent itself. Indeed, by the use of short cycles as taught by Skarstrom, it is kept at its "birth-place" (the point in the bed where it was generated), so as to be fully available for desorption, the desorption, however, using solely a part of the internally produced dry air.*

When operating the Skarstrom process for drying, the adsorption concentration front, i.e. the area wherein the effective water removal is occurring, progresses only a minute distance upwardly in the bed while the remainder of the adsorption bed further along remains unaffected and essentially totally dry (App. 111a). The cycle is reversed, and the expanded portion of dry product gas used to purge the bed moves countercurrently, but again only for a short time to push the adsorption front back the short distance it moved. Desorption is effected utilizing the heat which was retained in the bed at its birthplace during the adsorption step together with the dry air product of the adsorber without supply of any additional heat or extraneous gas for desorption.

The actual movement of the adsorption front over the course of adsorption, i.e. the area of actual activity, may be only one percent of the total bed in the Skarstrom process as compared to 14 or more percent in the closest prior art to Kahle** (testimony of Meissner; confirmed by defendants' expert Prutzman, App. 252a, 264a).

This difference in resultant movement of the front can be translated as drying air of 7,000 ppm moisture level to under 20 ppm pursuant to Skarstrom versus 2,000 ppm pursuant to Kahle (App. 191a-192a).

* App. 94a, 98a-99a, 100a-104a; col. 6, line 63 to col. 7, line 16, of patent in suit, PX 1, pp. E-12-E-13.

** App. 111a, 133a, 181a-182a as to Skarstrom; App. 141a-142a, 144a-145a, 165a-166a, 189a-192a as to Kahle.

No Question That Combination Is Novel

The Skarstrom process is admittedly novel since the grounds of invalidity urged were 35 U.S.C. §103 rather than §102. Section 102 applies where there is a complete disclosure of invention in the reference, whereas §103 deals with the more subtle question which presumes no such complete showing. It raises the issue of would it have been obvious to one skilled in the art to combine the teachings of the various references so as to meet the subject matter of the claims?

The combination of features summarized in Exhibit 16 was unique with Skarstrom in that he taught a self-contained, self-purging system capable of producing extremely dry air without the need for supplemental heaters, heat exchangers, or use of extraneous gas for purging.

ARGUMENT

POINT I

The Trial Court failed to recognize the key issue that a combination of known elements can be patentable.

A. A combination of individually known elements can be patentable.

The law is clear that a combination of individually known elements can comprise patentable invention.

Prutzman, defendants' expert witness and a patent attorney, correctly stated the law and indeed the key issue in the present case (App. 275a-276a) as follows:

"The patent statute says in order for something to be patentable it has to be unobvious. And if you've

got five steps known in the prior art and it's obvious to combine them, you've got an unpatentable invention. If it's unobvious to combine them, then you've got a patentable invention. * * * What I think you are trying to say is that even though a process claim claims only steps which individually are old, it may, under certain circumstances, be unobvious and a patentable invention, a valid claim."

The invention summary of Exhibit 16 quoted on pages 10 and 11 of the opinion (App. 47a-48a) illustrates that Skarstrom's process is such a combination of process steps. Both Meissner (App. 172a-175a) and Prutzman (App. 249a-250a) confirmed that the summary was an accurate description of the Skarstrom process.

The decided cases quite clearly support Prutzman's statement of the law that a combination of process features which may individually piecemeal be found in various references can nevertheless be patentable.

Patentability is possible even though "the elements of a combination may be all old." *Diamond Rubber Co. v. Consolidated Rubber Tire Co.*, 220 U.S. 428, 442 (1910). The inventive skill lies not in finding new elements but in combining existing elements in a nonobvious fashion. As the Supreme Court has recently stated:

It begs the question . . . to state merely that magnesium and cuprous chloride were individually known battery components. If such a combination is novel, the issue is whether bringing them together as taught by Adams was obvious in the light of the prior art. *United States v. Adams*, 383 U.S. 39, 50 (1966).

The Court has continually reaffirmed this position. See *Keystone Manufacturing Co. v. Adams*, 151 U.S. 139 (1894); *Great Atlantic & Pacific Tea Co. v. Supermarkets Equip-*

ment Corp., 340 U.S. 147 (1950); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57 (1969).

B. Plaintiff urges patentability to reside in a combination of features.

The Exhibit 16 invention summary sets forth eight distinct elements in a self-contained process as defining the Skarstrom process. The very fact that it calls for these various steps indicates that all are necessary. No one step can simply be discarded and still have the benefits of the Skarstrom process. This position was consistently taken by plaintiff. In their initial contact with Kahn in 1961 (Smolka memo of meeting)* plaintiff's representatives stated even if defendants' analysis of the art were correct "... we nevertheless know of no prior art suggesting the combination claimed by Skarstrom or the unobvious result achieved thereby"

In evaluating the present situation, the comments of the Supreme Court in *Diamond Rubber Co. v. Consolidated Rubber Tire Co.*, 220 U.S. 428 (1910) at pages 440-41 are controlling:

"The prior art was open to the Rubber Company. That 'art was crowded,' it says, 'with numerous prototypes and predecessors' of the Grant tire, and they, it is insisted, possessed all of the qualities which the dreams of experts attributed to the Grant tire. And yet the Rubber Company uses the Grant tire. It gives the tribute of its praise to the prior art; it gives the Grant tire the tribute of its imitation as others have done. And yet the narrowness of the

* Exhibit 11 of Pearlman Affidavit introduced as DX S(5), p. E-181.

** Page 1 of the June 11, 1965 letter from plaintiff's patent department to its German Agent (DX V(5), p. E-187) cited as an admission on page 24 of the opinion (App. 59a-60a), takes the same view: "But the combination of steps *even broadly*, is not available from the prior art."

claims seemed to make legal evasion easy. Why, then was there not evasion by a variation of the details of the patented arrangement? Business interests urged to it as much as to infringement. We can find no answer except that given by the Tire Company: "The patented organization must be one that is essential. Its use in the precise form described and shown in the patent must be inevitably necessary."

C. The Trial Court failed to recognize key principle of patent law.

The approach taken by defendants' expert, Prutzman, was to pick and choose from the ten references discussed at trial in depth* in order to find individual elements of the Skarstrom process in selected portions of this group of references (App. 269a-270a). Unfortunately, the Trial Court followed the same tack, i.e. simply analyzed each individual step above, and concluded that if each individual step could be shown in at least one reference, no invention could reside in the Skarstrom process.

As indicated above, the law is clearly to the contrary. A combination of individually known elements can in fact be inventive.

The rule in the Second Circuit was set forth by Judge L. Hand in *B. G. Corporation v. Walter Kidde & Co., Inc.*, 79 F.2d 20, 22 (1935):

"... All machines are made up of the same elements: rods, pawls, pitmans, journals, toggles, gears, cams, and the like, all acting their parts as they always do and always must. All compositions are made of the same substances, retaining their fixed chemical properties. But the elements are capable of an infinity of permutations, and the selection of that group which proves serviceable to a given need may require a high degree of originality. It is that act

* Defendants cited some 20 references in total (DX M(5)).

of selection which is the invention; and it must be beyond the capacity of commonplace imagination."

As later again stated by this Court through Judge L. Hand in the case of *Reiner v. I. Leon Co.*, 285 F.2d 501, 503 (1960):

"It is idle to say that combinations of old elements cannot be inventions; substantially every invention is for such a 'combination': that is to say, it consists of former elements in a new assemblage. All the constituents may be old, if their new concurrence would not have been obvious at the time the invention was made to a person having ordinary skill in the art' (§103, Title 35). That has been the statutory definition since January 1, 1953."

At no time was this basic principle of patent law recognized by, or applied, in the opinion of the Trial Court.

At no time did the Court below clearly pose the question "assuming each feature could be shown, was this nevertheless an unobvious combination?"

D. Piecemeal identification of individual steps not determinative of patentability.

On page 11 of the decision (App. 48a), the Court reduced the steps of the Skarstrom process to four for analysis, while the summary of invention called for eight steps. Most importantly, the Court overlooked that the present invention relates to "a completely self-contained, self-regenerating gaseous fractionating process . . . in which the adsorbent bed is the sole agent for fractionation and heat exchange. . . ."

Appreciation of the above is a highly important perspective in reviewing the prior art since processes which utilize readily available extraneous purge gas from downstream units such as air liquefaction plants (as did Kahle,

author of the closest references) are not anticipatory. One certainly could not hope to have a "plug-in" heaterless drier unit, which could be as small as suitcase size as was demonstrated before the Court (PX 15) and in the sales literature (PX 6C and 6D, pp. E-91—E-102), from systems which required the presence of an air liquefaction plant which typically requires space totally filling a trial court room (App. 118a-119a); and which represents investments of hundreds of thousands of dollars. While heated driers such as those Trinity and plaintiff's licensees had sold were of a "plug-in" type, they required the supply of heat for regeneration of the adsorber, and did not offer the advantages of the Skarstrom process.

Stated otherwise, the Judge overlooked key features which require that the purge gas be totally generated by the Skarstrom process while at the same time eliminating the need for any heaters or heat exchange mechanism.

E. The combination of features was not obvious.

That this was indeed unobvious to those skilled in the art is well documented by the facts brought forth during trial:

1. Heated driers had been known for many years (App. 94a-95a, 223a-224a), and Boyle's and Dalton's laws established for several hundred years.* Yet, the only automatic adsorptive driers apparently known in the trade were of the heated bed Trinity type (App. 224a), the very one which broke down in Skarstrom's laboratory (App. 204a).

2. Engineers, scientists and professors simply did not believe that the Skarstrom process would work. This is perhaps the clearest indication that the combination of features, *even when viewed in retrospect by those skilled in the art*, was unobvious.

* Encyclopedia Britannica, consulted by defendant's expert witness, pp. E-123—126.

—Dr. Skarstrom, a physicist with some 27 years research experience, was totally surprised (App. 206a-212a).

—The drier salesman was “appalled” that Dr. Skarstrom had found a process which worked without heaters (App. 213a).

—Feeley, Trinity’s president, was surprised since this was contrary to the literature and what had been widely accepted in the marketplace (App. 228a).

—The engineers to whom Trinity first attempted to sell heaterless driers simply did not believe they would work and refused to buy units until actual demonstrations in see-through units were made to overcome their disbelief (App. 229a-230a).

—Professor Meissner, a full professor at MIT for over 20 years, also was incredulous and had his doubts as to its feasibility (App. 127a).

Perhaps most telling, defendant’s own chief engineers, Kennedy and Sheldon, as well as Kahn himself, were “elated” by their discovery of the Skarstrom invention. They recognized it as an achievement they had never seen before and were sufficiently excited to proceed to file their own patent application on it (App. 290a).

How can one reconcile these facts with the Trial Court’s retrospective comments on pages 22 and 23 of the opinion (App. 58a-59a) to the effect that Skarstrom’s features were steps “in the directions which the prior art would lead one to expect. There was no sudden breakthrough which opened up exciting possibilities for the future . . . what the patentee did was simply a matter of following the prior art in a logical way.”

Clearly the experts expressed disbelief—but the art ultimately recognized that Skarstrom had made a significant contribution.

As noted by the Supreme Court in *United States v. Adams*, 383 U.S. 39, at 52 (1966) (decided simultaneously

with the *Graham v. Deere Co.* case, 383 U.S. 1 (1966) whose formula for nonobviousness the Trial Court applied on page 15 of its opinion):

"Nor are these the only factors bearing on the question of obviousness. We have seen that at the time Adams perfected his invention noted experts expressed disbelief in it. Several of the same experts subsequently recognized the significance of the Adams invention. . . ."

This history of the Skarstrom invention is quite analogous and clearly evidences nonobviousness.

Kahle, a German inventor, worked in the field of air liquefaction plants and adsorption technology for years* and had many patents issued to him as well as literature articles. Both parties agree Kahle represented the closest art. Yet, Kahle never produced or taught the self-contained, self-purging Skarstrom "plug-in" process. The 1953 Kahle article (PX 5F, p. E-67) summarized his work in the field and refers to German Patents 970,223, German 871,886 and German 882,541 (PX 5D, 5B, 5C, respectively, pp. E-47, E-23, E-33), the key patent references relied upon by defendant (App. 253a). This article shows that Kahle had an adsorber in the feed to an air liquefaction plant (App. 253a), and used the very large quantities of nitrogen, etc., from liquefaction plant to purge the adsorber (App. 164a, 165a, 266a).

The burden is on the infringer to affirmatively prove the combination unpatentable. As set forth by Judge Waterman of this Court in the recent case of *Shaw v. E. B. & A. C. Whiting Co.*, 417 F.2d 1097, 1104 (1969):

"Further, the burden is on the appellee to show *facts* that would lead to the conclusion that appellant's

* Kahle's earliest Patent U.S. 2,316,251 relied on by defendant was filed in Germany in 1938.

product was obvious. The mere recital of the known elements in the art does not, without more, invalidate the patent under Section 103. There must appear evidence that the *bringing together* of these elements would have been obvious."

All the foregoing illustrate that the combination of features claimed by Skarstrom was not obvious to those skilled in the art at the time the invention was made. Such a combination accordingly is patentable.

F. Relevancy attached to Trinity drier could only have been made in retrospect after having Skarstrom's teachings.

As noted previously, the unit which broke down in Skarstrom's laboratory was a Trinity drier, i.e., a standard heated bed unit. Page 16 of the opinion (App. 52a) notes the superficial similarity of the Trinity drier *apparatus* with the apparatus used for the practice of the Skarstrom process. Judge Blumenfeld appears to have considered this quite pertinent.

However, to do so, ignores the fact that the present invention is a *process* and not an apparatus. The Trinity drier was neither designed in a manner capable of operating in accordance with the process features set forth in the description of invention (PX 16 p. E-113), nor could it have operated in this manner. The fact that it had "a pair of desiccant beds and a timing device which regulated operation in a repetitive alternate cycle and valves which diverted a portion of the dried air under pressure into a pipe large enough to permit gas to expand to atmospheric pressure"* is a very long way indeed from the actual process that Skarstrom teaches. This is, perhaps, well illustrated in the following comparative table.

* Page 16 of opinion, App. 52a.

TRINITY DRIER *vs.* SKARSTROM PROCESS

<u>Condition</u>	<u>Typical Trinity Drier(a)</u>	<u>Typical Skarstrom Process(b)</u>
(1) Adsorption	6 hours	3 minutes
(2) Desorption	3 hours	3 minutes
(3) Temperature of Desorption	greater than 212° F.	no external heating; room temp.
(4) Cooling after Desorption	3 hours	none
(5) Fraction of product used for Purge	2-3%	25%
(6) Purpose of Purge	sweeps moisture cooked off adsorbent from the system	key means of moisture removal from adsorbent

(a) Trinity Bulletin A309 b, PX 6B, App. 206a-207a

(b) Skarstrom/Meissner Testimony

Contrary to page 16 of the opinion (App. 52a), the "washing gas" or "purge gas" in the Trinity drier did not function as a desorption agent in the sense of the Skarstrom purge gas. Rather it was a small trickle of gas used as a sweep or wash gas for removing moisture which had *already* been removed from the adsorbent by heating. Increasing the volume of the 2 or 3% of the Trinity drier's product used as purge by pressure reduction would give only about 10% of the amount of purge gas necessary for effecting desorption by the Skarstrom process—a process wherein no heat has been added to the adsorbent and the purge gas itself must act as the key means of moisture removal.

The Judge's highly generalized comparison is one that could only be made in hindsight after having Skarstrom's teaching and as such is improper.

As stated by this Court previously

"In resolving the question of obviousness, the judicial view must not include the knowledge contributed

by the patentee; the teachings of his patent are irrelevant when determining what 'would have been obvious' to one skilled in the prior art before he created his 'manufacture.'" *Shaw v. E. B. & A. C. Whiting Company*, 417 F.2d at 1105 (1969)

The fact is that the licensees of the Skarstrom patent are manufacturers of heated driers of the Trinity drier type. These people who are truly skilled in the art certainly recognized that Skarstrom represented a marked departure and improvement over the Trinity drier—one that had not been obvious to their engineers and customers. What was so apparently "obvious" to Judge Blumenfeld after being taught by the patent in suit and plaintiff's expert Professor Meissner what theoretically happens in the Skarstrom process was clearly unobvious to the manufacturers of the Trinity type drier, and indeed was totally contrary to their entire experience and knowledge.*

G. A detailed analysis of prior art indicates failure to teach the Skarstrom combination of features.

The following briefly summarizes the key distinctions over each of the references principally relied upon by defendants and used in the construction of defendants' Exhibit U (5) (p. E-185), a chart intended to demonstrate the lack of invention (App. 236a). It is noted that both defendants' expert witness, Prutzman, and the Trial Court preferred to ignore the distinctions and merely pick and choose such portions of the references as they deemed to be relevant.

Trinity Type-A Drier (PX 6B, p. E-85)—This was a heated drier using cycles of several hours in length and requiring an external supply of heat. The small amount (three percent) of product gas used in the regeneration cycle was employed as a sweep gas to remove water cooked

* See App. 227a-228a and Section E of Point I, supra p. 22 et seq.

out during the high temperatures of regeneration (App. 167a-170a). This was the unit which broke down in Skarstrom's laboratory. A detailed comparison with the Trinity drier is set forth in Section F of Point I above.*

1953 Kahle Article (PX 5F, E-67)—Most all-inclusive summary of Kahle's thinking and work in the field of adsorption. Relates to operations around air liquefaction plant, and particularly treating feed gas to the plant by means of an adsorber (App. 253a). Since the product of the air liquefaction plant is largely nitrogen having minimal use, Kahle teaches that it be used to purge an adsorber zone preceding the plant which may have been used for removal of carbon dioxide (so it does not freeze out and create problems at the very cold temperatures of the air liquefaction plant). Typically, Kahle employed three or four times the volume of purge gas to feed gas. This compares to Skarstrom's 1:1 ratio (claims 12 and 14, p. E-19)—highly important in Skarstrom where only the product dry air of his adsorber is available, and minimal "wasting" of it for purging critical. Kahle also indicates the use of a heater and cooler on opposite sides of the adsorbent bed (App. 271a).

As noted previously, the Kahle 1953 article expressly footnotes German Patents 871,886; 970,223 and 882,541 (key references relied on by defendant) relative to Kahle's description of his technical teachings (PX 5F at E-79, App. 253a). It accordingly serves to clarify the overall picture of what Kahle actually had in mind and truly suggested to the art.

Kahle German 970,223 (PX 5D, p. E-47)—Corresponds to U.K. 677,150 (PX 5E, p. E-63, see App. 156a). Both relate to the removal of carbon dioxide from air and subsequent use of that air in an air liquefaction plant. Kahle uses large quantities of purge gas during regeneration cycle, i.e., nitrogen such as produced in an air liquefaction

* *supra* p. 25 et seq.

plant* (App. 118a, 254a). The conditions set forth in the patent examples illustrate that it would be impossible to operate his process using simply a product of the adsorption zone for desorption (App. 124a-125a).

As noted by Professor Meissner, this patent illustrates

"... two of the traditional methods for regeneration of adsorber beds after they have picked up a key component.

"One of them, as we have seen earlier, is to pass through the beds relatively large volumes of purge gas. The purge gas volumes being in excess, being greater than the volumes of gases generated by the device itself in the adsorber part of the system.

"Another way, then, to heat these gases is to pass heated gases through the bed on desorption. . . ." (App. 139a)

Kahle German Patent 871,886 (PX 5B, E-23)—While generally indicating the use of short cycle times, the data given in the patent's drawings indicate movement of the reaction zone during adsorption of about 14 percent as compared to Skarstrom's one percent (App. 141a). In operating according to the reference, the reaction zone will travel a great distance through the bed "away from its birthplace." Heat will be carried out of the bed during adsorption (App. 143a-145a). This will not permit sufficient heat to be retained at its birthplace so that regeneration can be effected without external purge gas (or heating) (App. 143a-144a). It teaches the use of a fractionation product derived from the rest of the plant (App. 146a-147a). While this German patent is rather brief in its description, the term "Zerlegungsprodukt" (which the

* Air liquefaction plants cool air to sufficiently low temperatures to liquefy nitrogen and oxygen. Such plants comprise tall towers and other equipment requiring considerable area, e.g., size of a trial courtroom (App. 118a).

translation calls "fractionation product") relates to the product of the air liquefaction plant and not the adsorber itself. Professor Meissner, who is fluent in technical German and took his PhD in German (App. 77a), testified to this interpretation of the German patent, which is consistent with the use of the term "Zerlegungsprodukt" in the 1953 Kahle article which footnotes this same patent.*

German 882,541 (PX 5C, p. E-33)—Again illustrates use of extraneous gas, nitrogen, such as from a liquefaction plant, to purge an adsorber (App. 154a). Heat exchangers are placed on either side of the bed to capture lost heat, and to heat the extraneous purge gas (App. 155a).

Defendant also cited three non-Kahle patents in their chart Exhibit U(5) (p. E-185). How defendants' expert only selectively extracted portions of the references is well illustrated by the fact that all the foregoing distinctions were only admitted on his cross-examination.

Dailey, U.S. 2,535,902 (DX M(5), p. E-137)—This patent teaches adsorption until saturation and then heating the desiccant to 600°F. to boil off the water. Co-current (rather than counter-current flow) is used (App. 267a-270a). Similarly, *Erdman, U.S. 2,254,799* (DX M(5), p. E-129) adsorbs at -50°C., provides heating and cooling means, and employs no purge gas at all (see p. E-131, lines 38-40, 61-63 and 75 of the patent); while *MacMullin, U.S. 2,340,398* (DX M(5), p. E-133) similarly uses external

* Compare the original Kahle German article with the defendants' English translation. . . . "the usual cleaning and *fractionating* processes [Zerlegungsverfahren] where the condensation of a multi-component gaseous mixture often has to take place at a lower temperature than the evaporation, is that the evaporation of the condensate in the stream of the purge gas and the *fractionation* products [Zerlegungsprodukt] occurs at about the same or even at a lower temperature level than the condensation. . . ." (p. E-74 of PX 5F; emphasis added).

cooling (p. E-135 lines 40-50), long cycles which lose heat in the product which is cooled, and no purge gas for adsorption.

All these distinctions were conveniently overlooked in constructing defendants' chart, Exhibit U(5) (p. E-185) intended to show the Skarstrom process to be obvious.

H. Defendants' comparison chart admittedly in error.

Indeed, Prutzman ultimately acknowledges that his chart had various important errors.

The chart denotes the features of claims 12 and 14 (1:1 purge to feed volumes expressed in terms of partial pressure) as being "an inherent result if amount of water adsorbed is to equal amount of water desorbed." Prutzman later admitted it was not "inherent," i.e. that one could have water in equal to water out, and yet not have the 1:1 ratios simply by operating at the higher purge ratios of the references (App. 256a-257a). In contrast to the chart stating "Disclosed in Kahle German 970,223," Prutzman testimony on cross-examination admits this is simply not so (App. 254a).

Obviously the chart completely omitted all the distinctions noted previously over the references cited, and was an attempt to extract bits and pieces that were helpful to defendant (App. 270a).

This Court's statements in *Miehle Printing Press & Mfg. Co., v. Whitlock Printing Press & Mfg. Co.*, 223 Fed. 647 (1922) is quite appropriate relative to the Trial Court's retrospective interpretation of the prior art:

"We must admit that, looking at the situation as laymen, unskilled in mechanics, and enlightened by the situation as it is *after* the event, we would be inclined to agree with defendant in its statement of what was obvious before Hodgman appeared. But in our opinion the record does not indicate that this

is all there is to Hodgman's improvement. Past experience has shown us that what may seem obvious after disclosure was not obvious before, even to persons skilled in the art. *Brunswick Balke Co. v. Thum*, 111 Fed. 904, 50 C.C.A. 61; *Schenck v. Singer Mfg. Co.*, 77 Fed. 841, 23 C.C.A. 494." (at 649)

"... if Hodgman's device is not an improvement of Miehle's there is no apparent reason why defendant should use it; Miehle's will answer every purpose. Nevertheless defendant does use Hodgman's device, and has been willing to go to the expense of a lawsuit to maintain its right to do so, when it would have cost it nothing to use the old device of Miehle's expired patent." (at 650)

POINT II

The Trial Court erred in holding Skarstrom did not produce unexpected results

Pages 22 and 23 of the opinion (App. 58a) make the following comments with respect to the Skarstrom process:

"... the differences are certainly not outstanding * * * There was no sudden breakthrough which opened up exciting possibilities for the future. Qualitatively, his method produced no result different from that of the Trinity drier."*

If by the latter statement the Trial Court means that the Skarstrom drier and the Trinity drier are both driers, there can certainly be no quarrel. This, however, totally ignores the evidence that the Skarstrom process is capable of producing air of a dryness quality of only a fraction of one part per million water, a degree of dryness which Skarstrom could not even measure (App. 212a) and which he had not obtained when using heated bed driers (App. 210a).

* Page 14 of the opinion (App. 50a) similarly asserts the absence of "unpredictable results."

That Skarstrom's process could in fact work was a surprising and unexpected result (even if it gave the same dryness as the prior art's more expensive and problem-causing heated driers). The testimony of Dr. Skarstrom, Feeley, and Professor Meissner all illustrate the doubts of engineers and scientists at the time that the system would in fact work.

In addition, the Skarstrom drier offers advantages, which, to quote defendants' own introductory letter to his representatives,* "are startling—no heaters, no explosion hazard, extremely simple mechanism, reduced cost."

That indeed a certain breakthrough had been found is evidenced by the large number of companies which have licensed the Skarstrom patent worldwide. Prominent among these companies are manufacturers of heated driers,** which obviously shows significant advantages for the heaterless drier as well as a unique and unobvious contribution by Dr. Skarstrom.

As noted by Professor Meissner, Professor of Chemical Engineering at MIT for 20 years and an industrial consultant for over 30 years (App. 127a):

"It is the fact that he can split that product stream out of the adsorber into two parts and use one part to purge the adsorber which is being desorbed, which is on the regeneration cycle, and still have gas left over, which to me was very surprising when I first encountered this circumstance. I would have, instead, expected that a much larger quantity of purge gas would have to be used. And indeed until I saw the apparatus actually operated I must confess I was somewhat skeptical about the success

* Kahn's letter of November 11, 1957, attached to his affidavit (PX 9 p. E-105), and marked "Exhibit 121."

** See Pearlman Deposition, page 176 (DX W(6) at E-221) and pages 15-17 of Plaintiff's Answers to Defendants' First Set of Interrogatories, pp. E-108-E-110.

before I saw the Skarstrom apparatus demonstrated."

Indeed, Judge Blumenfeld noted during the trial (App. 137a): "No question. It is a very clever use of the device and there is no doubt about it."

It is submitted that the Skarstrom process did produce unexpected results as to degree of dryness and ability to operate, and which were ignored by the Trial Court.

This case has many of the elements of *United States v. Adams*, 383 U.S. 39, decided in favor of the patentee and utilizing the *Graham* test set forth on page 15 of the Trial Court's opinion (App. 51a). Applying the factors enunciated by the Supreme Court on pages 51 and 52 of *Adams* to the present case:

(1) Skarstrom's process gave *unexpected and superior results*—better drying ability as well as operating with neither heaters nor extraneous purge gas.

(2) It was *contrary to long accepted standards* which would have deterred expecting one could obtain a self-purging, self-regeneration fractionation process which neither heated the bed nor required an extraneous supply of purge gas (as was believed necessary for regeneration).

(3) At the time of the invention, *experts expressed disbelief* in its operability.

These factors led the Supreme Court to conclude the *Adams* battery was nonobvious. For these same reasons they evidence the nonobviousness of the present invention.

POINT III

The Trial Court misinterpreted significance of Boyle's law and Dalton's law.

A. Relates to gas pressure behavior—not adsorption.

As noted previously, Boyle's law states that at constant temperature, the volume of a gas is inversely proportional to its absolute pressure (App. 240a). Dalton's law provides that the total pressure of a gas mixture is the sum of the partial pressures of the individual gas components in the mixture (page 12 of decision, App. 49a).

Neither of these laws relates to adsorption of gases on solids—rather they relate to behavior of gases relative to pressure.

Accordingly, while of some relevance to the Skarstrom patent, they can hardly be described as providing a clear teaching as to a unique *adsorption* process which was in conflict with the prior art use of heaters and/or excess of extraneous purge gas for reversal of adsorption, i.e. desorption.

Defendants' expert, Prutzman, made it appear that Skarstrom's process was a simple application of high school physics. While the simplification is perhaps appealing, this hardly is consistent with the fact that engineers, physicists, and engineering professors at MIT doubted that the Skarstrom process would work, and certainly had failed to conceive of it earlier.

B. Trial Court draws erroneous technical conclusions.

The Trial Court's decision evidences an undue emphasis on the importance of Boyle's and Dalton's laws as making Skarstrom obvious (resulting from a skillful effort by

defendants' counsel). One, however, cannot conclude from Boyle's law that it "means that only one quarter of the product gas is needed to flow back through the desiccant as purge gas" if there is a pressure reduction from 60 to 15 pounds per square inch (page 13 opinion, App. 49a). Boyle's law says the volume of gas will increase fourfold under a fourfold drop in pressure, but it does not tell you what amount of gas is needed to purge an adsorbent (adsorption being a different phenomenon). Indeed, the Kahle patents which use three and four times as much purge gas illustrate that the statement simply cannot be concluded from Boyle's law.

Similarly, the lower Court's statement (App. 49a-50a) that "Dalton's law means that the partial pressure of water vapor which the purge gas can carry with it without becoming saturated, is the same whether the purge gas is at 15 or at 60 pounds per square inch pressure." Dalton's law says nothing to this effect.

The added statement (App. 50a) that "Thus the counter-flow of purge gas at 15 pounds per square inch" during desorption can carry as much moisture as imparted to the desiccant during adsorption by the moist feed gas at 60 pounds per square inch does not scientifically flow out of either Boyle's law or Dalton's law, neither of which relate to adsorption or removal of water from adsorbents.

It is clear from the above that the Trial Court erroneously applied these several hundred year old gas laws in an attempt to make obvious today what was so surprising to skilled engineers in 1956.

C. Skarstrom process hardly obvious from mere knowledge of Boyle's and Dalton's laws.

There is a crucial difference between a new development being explainable *in retrospect* by scientific principles after

having been perfected (as indeed is most often the case), and such a development having been obvious to those skilled in the art in the first place based on their knowledge of such scientific principles. The fact that after Edison invented the light bulb, the operation of the filament could be explained based on preexisting scientific principles did not make it any less an invention. Yet the lower Court intended to deprecate the nonobviousness of the Skarstrom invention when he stated the "explanation of the results obtained under the Skarstrom method is founded largely on previously known scientific principles." (opinion page 12, App. 48a)

It is indeed ironic that plaintiff's efforts to explain in retrospect what was happening in the Skarstrom process should have resulted in the Trial Court's becoming so well tutored as to conclude it was obvious in the first place from "known scientific principles"—a conclusion contrary to the actual reaction of those skilled in this art and well acquainted with Boyle's and Dalton's laws who would not accept that the Skarstrom process could even work.*

The Supreme Court's statement in *Diamond Rubber Co. v. Consolidated Tire Co.*, 220 U.S. 435, seems particularly appropriate:

"Knowledge after the event is always easy, and problems once solved present no difficulties, indeed, may be represented as never having had any, and expert witnesses may be brought forward to show that the new thing which seemed to have eluded the search of the world was always ready at hand and easy to be seen by a merely skillful attention."

* See Section E of Point I (*supra* p. 22 et seq.).

POINT IV

Use of German opposition claim improper.

A. Attempting to isolate a single feature in conflict with combination process both in Germany and the United States.

The claim in the opposition in Germany against the corresponding German patent (reproduced on page 18 of the decision, App. 54a) was admitted into evidence after the trial.* No trial testimony was taken as to German patent practice, nor the German opposition. Simply put, a translation of the German opposition claim was all that was placed in the record.

In its opinion, the lower Court then proceeded to make use of this German claim to prove the Skarstrom patent to be invalid.

Plaintiff is quite willing to judge the Skarstrom patent on the basis that while any one individual feature of the combination claims might be shown in a reference, the *combination* of features was unobvious over the prior art and therefore patentable. There is no conflict whatever between the German claim and plaintiff's position on appeal. Indeed, page one of the June 11, 1965 letter from plaintiff's patent department to their German agent (DX V(5) at p. E-203) referred to on page 24 of the opinion (App. 59a) states "Practically each individual step of Applicant's process, when examined on a 'broad' basis, may be found disclosed in one or another of these three references. *But* the combination of steps *even broadly*, is not available from the prior art." The three references referred to in the 1965 letter are German Patent 871,886, German Patent 970,223 and the Kahle 1953 article (PX 5B, 5D and 5E, respec-

* See letter to Judge Blumenfeld, App. 37a-38a.

tively), the very references defendants relied on and acknowledged by both parties as the most pertinent.

The above was plaintiff's position in 1965 (with respect to Germany); was plaintiff's position in its initial meeting with defendant in 1961 (Smolka's memo of Kahn meeting, App. 279a), and is plaintiff's position today.

B. Trial Court's interpretation of German patent law without testimony is in error.

(1) Analytical approach in conflict with invention claimed

No testimony was taken at, or after, trial as to German patent law. The lower Court's comments on German patent law were apparently derived solely by the correspondence between plaintiff's U.S. patent department and its agent in 1965 (DX V(5), pp. E-203-E-211). This correspondence was of record not with respect to the German opposition of July 1972, but was a "give and take" at an intermediate stage of the German patent application's consideration as to how best to claim the Skarstrom process—an invention which both the German patent agent and plaintiff's patent department conceded to be a combination of process steps, wherein invention lies in the combination of steps even if the steps could be individually shown piecemeal in the prior art.

Accordingly, the Trial Court improperly used the claim in the German opposition in the fashion of pages 18-20 (App. 54a-56a) of his opinion. If invention is predicated on a combination of individually known features, merely isolating one or two of these features (the German claim after the "characterizing") and finding an isolated showing of this feature or two is hardly conclusive. The process of bracketing off what is known in the art is a futile gesture. Determining whether it was obvious to combine the features claimed does not lend itself to a mechanical approach.

The lower Court is clearly in error in stating that "Since everything within the second set of brackets was accordingly admitted by Esso to be not new or novel, this matter could not satisfy the conditions of patentability imposed by our law in 35 U.S.C. §§ 101 and 102." (App. 55a)

Where invention resides in a combination of features, all the features must be considered *in combination*, and not on a piecemeal basis. A combination of individually known features clearly is patentable under U.S. law (see Section A of Argument, Point I). As noted previously by this Court, "It is idle to say that combinations of old elements cannot be inventions; substantially every invention is for such a 'combination'. . . ." (*Reiner v. I. Leon Co.*, 285 F.2d 501, 503 (1960)) The test is whether the combination would have been obvious to one skilled in the art at the time the invention was made.

The Trial Court fell into the trap of attempting a piecemeal analysis of a combination process where invention lies in the combination.

(2) *Insufficient evidence presented as to German patent law.*

Under the law prior to 1966, it was the burden of the party relying on foreign law to introduce expert testimony on such foreign law. Foreign law was an issue of fact to be pleaded and proven, *Cuba R.R. Co. v. Crosby*, 222 U.S. 473 (1911). The Second Circuit demanded a high degree of proof, preferring to have the testimony of an expert who had practiced in the foreign country at issue, *Usatorre v. The Victoria*, 172 F.2d 434 (1949). The party raising the issue of foreign law could not avoid this problem by utilizing the device of judicial notice.*

* "Neither do I choose to take judicial notice of the Greek law as a matter of discretion. The difficulties of language, the insubstantial assistance provided by respondent's counsel, and the courts

The Federal Rules of Civil Procedure were amended in 1966 to alleviate some of the difficulty in proving an issue of foreign law:

"The court, in determining foreign law, may consider any relevant material or source, including testimony, whether or not submitted by a party or admissible under Rule 43. The court's determination shall be treated as a ruling on a question of law." F.R.C.P. 44.1 (1966).

The Advisory Committee's notes make clear that the purpose of this new rule was not to eliminate the need for evidence but rather to increase the materials available as evidence. It did not lower the standard of proof. The rule was not intended to allow the court to treat foreign law as a case of judicial notice. It was meant to provide a flexible procedure to utilize as much relevant material as needed to achieve a sound result (39 F.R.D. 69, 119).

The case of *Dulles v. Katamoto*, 256 F.2d 545 (9 Cir. 1958), illustrates that the federal courts expect adequate expert testimony on foreign law and the failure to produce it may damage a litigant's case. In the *Dulles* case, the U.S. government attempted to prove Japanese law by producing a statement written by one Japanese official to another as well as two opinions from nonlawyers. The Court concluded that the absence of "testimony of an experienced Japanese practitioner" raised an inference that the law was contrary to the construction advanced by the government.

unfamiliarity with the legal system involved alone persuade me not to exercise my discretion as respondent requests. Moreover, there are indications that under the circumstances an opposite choice would be error." *Petition of Petrol Shipping Corp.*, 37 F.R.D. 437, 440 (S.D.N.Y. 1965). See also *Walton v. Arabian American Oil Co.*, 233 F.2d 541 (2 Cir. 1956).

In the present case, the Trial Court relies solely on an exchange of correspondence in 1965 not specifically relating to the German opposition claim quoted in the opinion, and antedating by seven years the German opposition claim's form, introduction and German law as it stood in 1972. No expert testimony on German law was given.

By restricting itself to the statements in the correspondence, the Trial Court acted contrary to the necessary standard of proof regarding foreign law. Such a procedure certainly falls short of the "complete presentation by counsel"* contemplated by the Advisory Committee who formulated Rule 44.1.

C. Trial Court's interpretation of German opposition claim in conflict with German law.

Pages 18 to 20 of the opinion (App. 54a-56a) interpreted the formulation of the corresponding German opposition claim as an "admission" on the theory that: (a) everything before the characterizing clause was old; (b) everything after the characterizing clause is new except for anything labeled "known per se." The Trial Court then interpreted that in effect plaintiff only relied for patentability in Germany on two features, namely: (1) use of product of adsorber as purge, and (2) adsorption/desorption cycle times of two to three minutes each.

As previously noted, no testimony was taken on German patent practice.**

* 39 F.R.D. 69, 118.

** The opinion relied on the 1965 correspondence between plaintiff's patent department and German agent (DX V(5)). Note, however, line 1 of Paragraph (C) of the German agent's July 8, 1965 response (at E-213) disagrees with the former's view of the "precharacterizing clause" when the invention is a combination. None of this correspondence related to the actual German claim introduced seven years later in July 1972.

In fact, these conclusions do not follow from German patent law. Quoted below is a translation of pages 458 and 459 of the 1973 Edition of Benkard, a treatise on German patent law* generally considered the leading commentary on German patent law. It clearly evidences that the *form* of the German claim is totally *insignificant* in itself as to the determination of the definition of invention. Thus the German opposition claim could not give rise to the Trial Court's limited interpretation of where invention was alleged to reside; or to serve as an "admission."

"The structure of the claim which normally consists of a preamble and a characterizing clause reciting the new features is in itself and of itself insignificant to the determination of the subject matter of the invention. (See paragraph 26, items 27 to 29.) It is immaterial to the subject matter of a patent involving several features whether a particular limitation is recited in the preamble or in the characterizing clause. In support of this statement, 12 decisions of the former Reichsgericht, 4 decisions of the Federal Court (Supreme Court), 1 decision of a Circuit Court of Appeals and 1 decision of a District Court are cited. If the invention resides in a combination, the patent-sustaining feature may be seen in an element (or step) recited in the preamble. (1 decision by the Federal Court and 1 decision by the Reichsgericht) The fact that one or the other feature is recited in the characterizing clause does not prove it represents the inventive feature. (1 decision by the Federal Court) The subject matter of a patent is made up both by the limitations recited in the preamble and the limitations recited in the characterizing clause. (1 Reichsgericht decision) The fact that an element or step of a combination is

* Book entitled "Patentgesetz Gebrauchsmustergesetz," by Georg Benkard, C. H. Beck'sche Verlagsbuchhandlung, München 1973. The cover page and pages 458-459 in German appear in the volume of exhibits at pp. E-115-E-117.

recited in the preamble does not mean it is insignificant to the total combination. (1 Reichsgericht decision) The external structure of the claim is as a rule not decisive for the determination of the scope (4 Reichsgericht decisions)."

POINT V

The Trial Court misapplied test of Supreme Court as to Standard of Patentability.

On page 25 of the opinion (App. 60a-61a), the Court below quoted Justice Douglas in the *Great Atlantic & Pacific Tea Co. v. Supermarkets Corp.*, 340 U.S. 147, 154-155 (1950), to wit:

"The invention, to justify a patent, had to serve the ends of science—to push back the frontiers of chemistry, physics, and the like; to make a distinctive contribution to scientific knowledge. That is why through the years the opinions of the Court commonly have taken 'inventive genius' as the test. It is not enough that an article is new and useful. The Constitution never sanctioned the patenting of gadgets. Patents serve a higher end—the advancement of science."

The foregoing principles requiring "inventive genius" simply do not constitute the law as evidenced by the 1952 Patent Act, adopted after Justice Douglas's remarks quoted above.

Section 103 of the Patent Act of 1952 states clearly that the third test of patentability should be nonobviousness as opposed to "inventive genius." According to that section a patent will not be allowed "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person hav-

ing ordinary skill in the art to which said subject matter pertains." In specifically addressing itself to the so-called "inventive genius" test, Congress added the following sentence to leave no doubt that a "flash of genius" or the like was not required.

"Patentability shall not be negatived by the manner in which the invention was made."*

The Supreme Court in *Graham v. Deere*, 383 U.S. 1 (1966), acknowledged the existence of some confusion and expressly disavowed the use of such "inventive genius" test in determining patentability. The Court in *Graham* pointed out that the phrase "flash of creative genius" had been misinterpreted and misapplied and the true test was whether the "subject matter sought to be patented [was] beyond the skill of the calling," 383 U.S. at 15, f.n. 7. In other words, it must not be obvious.

The Trial Court did not apply the standard of non-obviousness called for by the 1952 Patent Act, but rather improperly based his opinion on the "inventive genius" test enunciated by Justice Douglas earlier, which is clearly not the law.

The further quote from Justice Douglas's *A&P* opinion, however, is of note:

"An invention need not be as startling as an atomic bomb to be patentable. But it has to be of such quality and distinctions that masters of the scientific field in which it falls will recognize it as an advance."
(at 155)

The Skarstrom invention meets this test. The fact that experts, skilled engineers (as well as professors), did not

* Reviser's Note to 1952 Act states: "The second sentence states that patentability as to this requirement is not to be negatived by the manner in which the invention was made, that is, it is immaterial whether it resulted from long toil and experimentation or from a flash of genius."

believe it would work clearly shows an advance over the art—hardly a “gadget.” The further fact that those quite skilled in this art, i.e. manufacturers of the closest prior art unit (heated driers) have licensed the Skarstrom invention certainly meets the test that “masters of the scientific field in which it falls will recognize it as an advance.”

CONCLUSION

We submit that the judgment of District Court dismissing the complaint on the basis of invalidity of Skarstrom Patent, U.S. 2,944,627, should be reversed, and the patent judged valid, and the case remanded to the District Court for the determination of the issue of damages.

Respectfully submitted,

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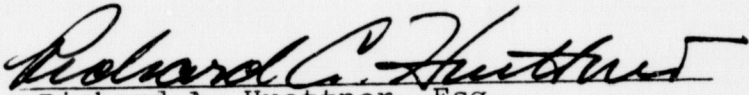
September 13, 1974

UNITED STATES COURT OF APPEALS
FOR THE SECOND CIRCUIT

----- x
ESSO RESEARCH & ENGINEERING COMPANY :
Plaintiff-Appellant, :
v. : No. 74-1765
KAHN AND COMPANY, INC. AND :
CHANDLER-EVANS, INC., :
Defendants-Appellees. :
----- x

CERTIFICATE OF SERVICE

It is hereby certified that three copies of the BRIEF FOR PLAINTIFF-APPELLANT were served upon Roger B. McCormick, Esq., McCormick, Paulding & Huber, 101 Pearl Street, Hartford, Connecticut 06103, by depositing copies in the United States mail, postage pre-paid, this 9th day of December, 1974.


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NOTICE OF ENTRY

Sir:- Please take notice that the within is a (certified)
true copy of a
duly entered in the office of the clerk of the within
named court on 19

Dated,

Yours, etc.

Attorney for
Office and Post Office Address

To

Attorney(s) for

NOTICE OF SETTLEMENT

Sir:- Please take notice that an order

of which the within is a true copy will be presented
for settlement to the Hon.

one of the judges of the within named Court, at

on the day of 19

at M.

Dated,

Yours, etc.,

Attorney for
Office and Post Office Address

To

Attorney(s) for

Index No. 74-1765

Year 19 74

UNITED STATES COURT OF APPEALS
FOR THE SECOND CIRCUIT

ESSO RESEARCH & ENGINEERING
COMPANY,

Plaintiff-Appellant,

v.

KAHN & COMPANY, INC. AND
CHANDLER-EVANS, INC.,

Defendants-Appellees.

CERTIFICATE OF SERVICE

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To

Attorney(s) for

Service of a copy of the within

is hereby admitted.

Dated,

Attorney(s) for

STATE OF NEW YORK, COUNTY OF

ss.:

The undersigned, an attorney admitted to practice in the courts of New York State,

☐ Certification By Attorney certifies that the within has been compared by the undersigned with the original and found to be a true and complete copy.
☐ Attorney's Affirmation shows: deponent is

the attorney(s) of record for in the within action; deponent has read the foregoing and knows the contents thereof; the same is true to deponent's own knowledge, except as to the matters therein stated to be alleged on information and belief, and that as to those matters deponent believes it to be true. This verification is made by deponent and not by

The grounds of deponent's belief as to all matters not stated upon deponent's knowledge are as follows:

The undersigned affirms that the foregoing statements are true, under the penalties of perjury.

Dated:

The name signed must be printed beneath

STATE OF NEW YORK, COUNTY OF

ss.:

☐ Individual Verification the foregoing the being duly sworn, deposes and says: deponent is in the within action; deponent has read and knows the contents thereof; the same is true to deponent's own knowledge, except as to the matters therein stated to be alleged on information and belief, and as to those matters deponent believes it to be true.
☐ Corporate Verification the of in the within action; deponent has read the foregoing and knows the contents thereof; and the same is true to deponent's own knowledge, except as to the matters therein stated to be alleged upon information and belief, and as to those matters deponent believes it to be true. This verification is made by deponent because is a corporation and deponent is an officer thereof

The grounds of deponent's belief as to all matters not stated upon deponent's knowledge are as follows:

Sworn to before me on

19

The name signed must be printed beneath

STATE OF NEW YORK, COUNTY OF

ss.:

is over 18 years of age and resides at

being duly sworn, deposes and says: deponent is not a party to the action

☐ Affidavit of Service By Mail On 19 deponent served the within attorney(s) for upon in this action, at

the address designated by said attorney(s) for that purpose by depositing a true copy of same enclosed in a post-paid properly addressed wrapper, in a post office official depository under the exclusive care and custody of the United States Postal Service within the State of New York

☐ Affidavit of Personal Service On 19 at upon deponent served the within

th herein, by delivering a true copy thereof to h personally. Deponent knew th person so served to be the person mentioned and described in said papers as the therein

Sworn to before me on

19

The name signed must be printed beneath